



PREVALENCE OF HYPOTHYROIDISM IN DIABETES MELLITUS IN DR RPGMC TANDA IN SUBHIMALYAN REGION

Endocrinology

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ABSTRACT

Objectives: Thyroid disease and diabetes mellitus (DM) are the two most common endocrine disorders encountered in clinical practice. Diabetes and thyroid disorders have been shown to mutually influence each other and an association between both conditions have been reported in literature. Thyroid disease is a pathological state that can adversely affect glycemic control in diabetics and has the potential to affect the health. **Material and method:** This study was designed to know the prevalence of hypothyroidism in diabetic patients in our institution. 200 patients with diabetes mellitus attending the medicine department at Dr RPGMC Kangra at Tanda fulfilling the inclusion and exclusion criteria were included in the study and screened for hypothyroidism by doing thyroid profile. **Results:** It was found that hypothyroidism was present in 33% patients with diabetes. **Conclusion:** On the basis of this study, it is recommended to routinely screen patients of diabetes for hypothyroidism to prevent mortality and morbidity.

KEYWORDS

diabetes and hypothyroidism

INTRODUCTION

Thyroid disease and diabetes mellitus (DM) are the two most common endocrine disorders encountered in clinical practice. Diabetes and thyroid disorders have been shown to mutually influence each other and an association between both conditions have been reported in literature. Thyroid disease is a pathological state that can adversely affect glycemic control in diabetics and has the potential to affect the health. Thyroid disease is found commonly in diabetes and is associated with advanced age, particularly in T2DM and underlying autoimmune disease in T1DM¹.

A study done by WHO estimated that the worldwide prevalence of diabetes in 2002 was 170 million, with the number predicted to grow to 366 million or more by 2030².

The reports showing the association between diabetes and thyroid dysfunction were first published in 1979³. There is great variability in the prevalence of thyroid disorder in general population, ranging from 6.6% to 13.4%⁴. These differences can be explained by different diagnostic criteria of thyroid disorder, the degree of iodine intake among different regions, different sensitivities of the TSH assays and the large population diversity⁵.

Hypothyroidism, the most commonly diagnosed thyroid disorder in all studies conducted so far; has greater implications for type 2 diabetics in whom there is pre-existing dyslipidemia and the risk of cardiovascular disease is increased⁶.

Hypothyroidism carries a risk of dyslipidemias which can aggravate, if patient has concomitant diabetes mellitus. So it is important to evaluate diabetic population regarding hypothyroidism, as one condition can worsen the other if left untreated in form of worsening of DM and dyslipidemias and causing diverse complications. Therefore, it is imperative to screen diabetic population regarding hypothyroidism.

The "American Thyroid Association" recommends testing of thyroid function in all adults beginning at age of 35 years and reassessing thyroid function every 5 years. More frequent testing is indicated in high risk individuals⁷. The American Association of Clinical Endocrinologists, Thyroid Disease Clinical Practice Guidelines (2002) recommends thyroid palpation and TSH in diagnosis, especially if goitre or other autoimmune disease is present in association with DM⁸. Regular screening for thyroid abnormalities in all diabetic patients will allow early treatment of subclinical thyroid dysfunction. A sensitive serum TSH assay is the screening test of choice.

MATERIALS AND METHODS

200 patients with diabetes mellitus attending the medicine department at Dr RPGMC Kangra at Tanda fulfilling the inclusion and exclusion criteria were included in the study.

INCLUSION CRITERIA:

- 1) All patients more than 18 years of age with diabetes mellitus.
- 2) All patients with diabetes willing to participate in this study.

EXCLUSION CRITERIA:

Patients who had secondary causes of hypothyroidism like

- Radioiodine ablation
- On antithyroid drugs
- Had undergone thyroid surgery.
- Diagnosis of diabetes mellitus was done as per American Diabetes Association (ADA) 2018 criteria.
- T3, T4, TSH and anti TPO antibody were estimated by using DIASORIN immunoassay LIAISON analyser with product code 311211. This machine does the quantitative determination of TSH in human serum via chemiluminescence immune assay method. Venous blood samples (about 2ml) of participants were collected into serum tubes, allowed to clot and the serum was centrifuged. Then sample was put on fully automated LIAISON machine and reading of test appeared automatically on computer screen which was attached with machine.
- According to American association of clinical endocrinologists and the American thyroid association (December 2012)
- Normal value of TSH based on the NHANES III reference population range from 0.45-4.12mIU/L.
- More than 4.12-10mIU/L is subclinical hypothyroidism.
- Overt hypothyroidism is TSH >10mIU/L.

RESULTS

Out of 200 patients, 125 (62.5%) patients had TSH level in range of 0.45-4.12mIU/L, 49 (24.5%) patients had TSH between 4.12-10mIU/L and 17 (8.5%) patients had TSH >10mIU/L.

Table 1: Distribution Of Patients On Basis Of Level Of Tsh

TSH	Patients	Percentage%	Thyroid Status
<0.45	9	4.5	Hyperthyroidism
0.45-4.12	125	62.5	Euthyroid
4.12-10	49	24.5	Subclinical Hypothyroidism
>10	17	8.5	Overt Hypothyroidism

Out of 200 diabetic patients, 66 (33%) patients were hypothyroidism.

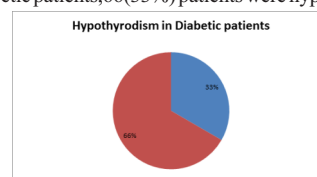


Figure 1b : Prevalence Of Hypothyroidism In Diabetic Patients

Out of 66 diabetic patients with hypothyroidism, 49(74.24%) patients had subclinical hypothyroidism and 17(25.76%) patients had overt hypothyroidism.

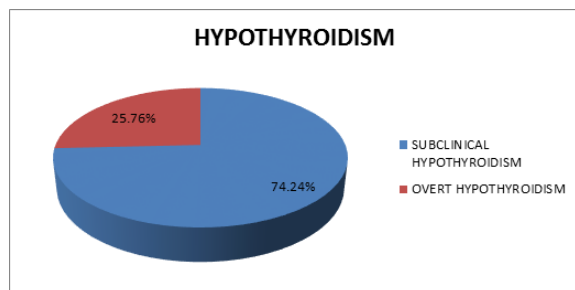


Figure 1c: Distribution Of Hypothyroidism In Diabetic Patients

SEX BASED PREVALENCE OF HYPOTHYROIDISM IN DIABETES MELLITUS

Sex	Patient with hypothyroidism	Percent%
Female	38	57.6
Male	28	42.4
Total	66	100

Age group based prevalence of hypothyroidism

Among 66 patients of diabetes mellitus and hypothyroidism, maximum patients 27(40.9%) were in age group 51-60 year of age followed by 20(30.3%) patients were in age group 61-70 year of age.

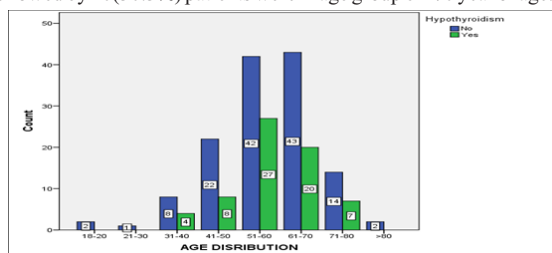


Figure 1d: Age Group Based Prevalence Of Hypothyroidism In Dm

RELATIONSHIP BETWEEN DIABETIC PATIENTS WITH HYPOTHYROIDISM AND DURATION OF DIABETES MELLITUS

Duration of DM (in years)	Patient with hypothyroidism and DM	Percentage %
<1	11	16.7
1-10	31	47.0
11-20	21	31.8
>20	3	4.5
Total	66	100

Out of 66 diabetic patients with hypothyroidism, 22(33.33%) patients had FBS ≥ 200 mg/dl and 44(66.67%) patients had FBS between <200mg/dl.

FBS(mg/dl)	Diabetic patients with hypothyroidism	Percentage%
<200	44	66.67
≥ 200	22	33.33
Total	66	100

Among 66 patients with diabetes mellitus and hypothyroidism, 38(57.6%) patients had TG levels more than 150mg/dl and 28 (42.4%) had TG levels less than 150mg/dl.

TG LEVEL IN PATIENT WITH DM AND HYPOTHYROIDISM

TG(mg/dl)	Patient with hypothyroidism	Percent
>150	38	57.5
<150	28	42.5
Total	66	100

DISCUSSION

In the present study, the patients were taken from medicine OPD in Dr RPGMC Kangra at Tanda. A total of 200 patients were enrolled into the study during the study period, out of which 100 were male patients and 100 were female patients.

In the present study, out of 200 diabetic patients, 66 (33%) patients had hypothyroidism. Out of 66 diabetic patients with hypothyroidism, 49(74.24%) patients had subclinical hypothyroidism and 17(25.76%) patients had overt hypothyroidism. In our study, the prevalence of hypothyroidism was 33% in diabetic patients. Uppal et al enrolled 120 patients of T2DM, 20(17%) had hypothyroidism⁹. Makandar et al studied 100 patients with diabetes mellitus, out of which 22(22%) patients had hypothyroidism¹⁰. A study done by Singh G et al, enrolled 80 patients with type 2 diabetes mellitus and 80 healthy people were in control group, out of which 19(23.75%) had hypothyroidism¹¹. Khalid SA et al studied retrospectively 3760 participants who were between the age 20 to 98 years. Out of them, 1531(40.5%) patients had type 2 diabetic mellitus. Among 1531 type 2 diabetic patients, 467 (30.7%) patients had hypothyroidism¹².

Out of 200 diabetic patients, 49(24.5%) patients had subclinical hypothyroidism and 17(8.5%) patients had overt hypothyroidism. Elmenhawy et al 200 patients with type 2 diabetes mellitus, 50(25%) patients had subclinical hypothyroidism and 7(3.5%) patients had overt hypothyroidism¹³. Another study by Ravishankar et al, 100 patients with type 2 diabetes mellitus were screened for thyroid disorders, 15(15%) had subclinical hypothyroidism and 1(1%) had overt hypothyroidism¹⁴. A study by Singh et al showed 23.75% prevalence of hypothyroidism in type 2 diabetic patients, with 15% had subclinical hypothyroidism and 8.75% had overt hypothyroidism¹⁵.

Out of 66 diabetic patient with hypothyroidism, 25(37.87%) patients belonged to age group 51-60 years and 20(30.30%) patients belong to age group of 61-70 year. The studies done by Ravishankar SNet al and Vondra et al also found high prevalence of hypothyroidism in diabetic patients with advancing age^{14,16}. In the study Khurana A et al, the overall prevalence of thyroid disease in T2DM was higher in females and higher age¹⁷. Thus with increasing age the prevalence of hypothyroidism in type 2 diabetic patients showed an increasing trend.

In our study, the prevalence of hypothyroidism was more in females as compared to males. Out of 66 diabetic patients with hypothyroidism, 38(57.58%) were female patients and 28(42.42%) were male patients. It is well established that hypothyroidism is more common in diabetic females. Our results were consistent with studies of Vondra et al¹⁶, Celani et al¹⁸ and Michalek et al¹⁹ and in which they also reported prevalence of thyroid disorder higher in diabetic females as compared to diabetic male. The NHANES III study reported that the prevalence of subclinical hypothyroidism was 3.4% in males and 5.8% in females²⁰. Estrogen hormone has direct role in thyroid follicular cells and its role in thyroxine binding globulin, explain higher level of TSH in type 2 diabetic females²¹.

Out of 66 diabetic patients who had hypothyroidism, 11(16.7%) patients had duration of diabetes <1 year, 31(47.0%) patients had duration of diabetes 1-10 years, 21(31.8%) patients had duration of diabetes 11-20 years, 3(4.5%) patients had duration of diabetes more than 20 years. However, this difference when evaluated statistically was not significant (p-value>0.05). Thus we found that the prevalence of hypothyroidism was not significantly affected with duration of diabetes. Our results are in concordance with Diez et al who also found no significant relationship between presence of hypothyroidism and duration of diabetes²².

In our study, out of 66 diabetic patients with hypothyroidism, 22 (33.33%) patients had FBS ≥ 200 mg/dl and 44 (66.67%) patients had FBS <200mg/dl. However no statistically significant relation of uncontrolled hyperglycemia with hypothyroidism was found in our study (p-value>0.05) which was similar to the study done by Nair et al²³. Khurana A et al and Ardekani MA et al in their studies showed the prevalence of thyroid disorder in T2DM was more with uncontrolled diabetes^{17,24}.

In our study out of 66 patients with DM and hypothyroidism, 32 (48.48%) patients had hypercholesterolemia and 38(57.57%) patients had hypertriglyceridemia. The prevalence of hypothyroidism was found to be more in patients who had dyslipidemia as compared to those in whom dyslipidemia was not present. This difference was statistically significant (p value<0.05). It was also reported in various studies done by Ardekani MA et al²⁴ and Elder J et al²⁵.

REFERENCES

- Johnson JL. Diabetes control in thyroid disease. *Diabetes Spectr*.2006;19:148–53.

- 2) Swamy RM, Kumar N, Srinivasa K, Manjunath GN, Byrav DSP et al. Evaluation of hypothyroidism as a complication in type II diabetes mellitus. *Biomed Res.*2012; 23(2): 170–2.
- 3) Papazafiropoulou A, Sotiropoulos A, Kokoloki A, Kardara M, Stamataki et al. Prevalence of thyroid dysfunction among greek type 2 diabetic patients attending an outpatient clinic. *J Clin Med Res.* 2010;2:75–78.
- 4) Umpierrez GE, Latif KA, Murphy MB, Lambert HC, Stentz F et al. Thyroid dysfunction in patients with type 1 diabetes. *Diabetes Care.*2003;26:1181–1185.
- 5) Chen G, Juan W, Yinghua L. Associations between cardiovascular risk, insulin resistance, β -cell function and thyroid dysfunction : a crosssections study in She ethnic minority group of Fujian Province in China. *Euro J Endocrinol.*2010;163:775–782.
- 6) Ghazali SM , Abbiyesuku FM. Thyroid dysfunction in type 2 diabetes seen at the University College Hospital, Ibadan, Nigeria. *Nig. J. Physiol. Sci.* 2010;25: 173–179.
- 7) Ladenson PW, Singer PA, Ain KW. American thyroid association guidelines for detection of thyroid dysfunction. *Archives of Internal Medicine.*2000;160:1573-1575.
- 8) Baskin HW, Cobin RH, Duick DS. American Association of Clinical Endocrinologists medical guidelines for clinical practice for the evaluation and treatment of hyperthyroidism and hypothyroidism. *Endocrine Practice.*2002;8:457-469.
- 9) Uppal V, Vij C, Bedi GK, Vij A, Banerjee BD. Thyroid Disorders in Patients of Type 2 Diabetes Mellitus. *Ind J Clin Biochem.*2013;28:336–341
- 10) Makandar A, Sonagra AD, Shafi N. Study of thyroid function in type 2 diabetic and non-diabetic population. *International Journal of Medical Science and Public Health.* 2015; 4:10-16.
- 11) Singh G, Gupta V , Sharma AK, Gupta N. Evaluation of Thyroid Dysfunction Among type 2 diabetic Punjabi Population. *Adv. Biores.* 2011; 2:3-9.
- 12) Khalid SA, Samia AB, Muneera AA, Patan MK, Abdulla MM et al. The Prevalence of Hypothyroidism in Patients with Type 2 Diabetes Mellitus in Saudi Community based Hospital. *Curr Res Diabetes Obes J.*2019;11(3):55812.
- 13) Elmenshawi IM, Alotaibi SS, Alazmi AS, Alazmi AM, Alruwaili FR et al. Prevalence of Thyroid Dysfunction in Diabetic Patients. *J Diabetes Metab Disord Control.*2017; 4:100-106.
- 14) Ravishankar SN, Champakamalini, Venkatesh, Mohsin. A prospective study of thyroid dysfunction in patients with Type 2 diabetes in general population. *iMedPub Journals.* 2013; 5:07-12.
- 15) Singh G, Gupta V , Sharma AK, Gupta N. Evaluation of Thyroid Dysfunction Among type 2 diabetic Punjabi Population. *Adv. Biores.* 2011; 2:3-9.
- 16) Vondra K, Vrbikova J, Dvorakova K. Thyroid gland diseases in adult patients with diabetes mellitus. *Minerva Endocrinol.*2005;30:217-36.
- 17) Khurana A, Dhaut P, Jain G. Prevalence of thyroid disorders in patients of type 2 diabetes mellitus. *JIACM.*2016;17(1):12-15.
- 18) Celani MF, Bonati ME, Stucci N. Prevalence of abnormal thyrotropin concentrations measured by a sensitive assay in patients with Type 2 diabetes mellitus. *Diabete Res.*1994;27(1):15-25.
- 19) Michalek M, Mahoney C, Calebaugh D. Hypothyroidism and diabetes mellitus in an American Indian population. *J Family Practice.*2000; 49(7): 53-5
- 20) Hollowell JG, Staehling NW, Dana FW, Hannon WH, Gunter EW et al. Serum TSH, T4, and Thyroid Antibodies in the United States Population: National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metab.*2002;87(2):489–499.
- 21) Akbar DH, Ahmed MM, Mughales JA. Thyroid dysfunction and thyroid autoimmunity in Saudi type 2 diabetics. *Acta Diabetologica* 2006;43(1):14-18
- 22) Diez JJ, Sanchez P, Iglesias P. Prevalence of thyroid dysfunction in patients with type 2 diabetes mellitus. *Exp Clin Endocrinol Diabetes.*2011;119(4):201-7.
- 23) Nair A, Jayakumari C, Jabbar PK, Jayakumar RV, Raizada N et al. Prevalence and associations of Hypothyroidism in Indian patients with Type 2 Diabetes Mellitus. *Journal of Thyroid Research.*2018 Aug;5386129.
- 24) Ardekani MA, Rashidi M, Shojoadiny A. Effect of thyroid dysfunction on metabolic response in type 2 diabetic patients. *Iranian J Diabetes and Obesity.* 2010;2(1):20-6.
- 25) Elder J, McLelland A, Reilly DS, Packard CJ, Series JJ et al. The relationship between serum cholesterol and serum thyrotropin, thyroxine and tri-iodothyronine concentrations in suspected hypothyroidism. *Ann Clin Biochem.* 1990;27(2):110-113.